Space Weather Technical Forecast

Issued on Wednesday, 01 June 2022 at 01:17 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Slight chance of Moderate activity. Active electron fluence expected.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been Very Low, with no significant activity. There are five regions on the visible disc, but all of these are simple and currently inactive. No Earth directed CMEs have been observed in coronagraph imagery.

Solar Wind / Geomagnetic Activity: The solar wind, as observed by DSCOVR at L1 has gradually declined from 550km/s to around 500km/s, as the current coronal hole high speed stream slowly eases. Density has been close to average throughout. Total interplanetary magnetic field strength has been weak, with the north-south component, Bz, also varying weakly. Phi angle was predominantly negative (towards the Sun). Geomagnetic activity was Quiet to Unsettled.

Energetic Particles / Solar Radiation: The high energy proton flux (10 MeV) has been at background levels. The high energy electron flux (greater than 2 MeV) varied between moderate and high levels, reaching 5300 pfu at 31/1625 UTC. Electron fluence has been above the Active threshold, following a steady trend, reaching 1.5e8 integrated pfu at 31/2400UTC.

Four-Day Space Weather Forecast Summary
Solar Activity: Solar activity is expected to be Low or Very Low, with a slight and decreasing chance of Moderate activity from a sunspot close to the western limb.

Solar Wind / Geomagnetic Activity: There is a low risk that a CME which left the Sun on 28 May could glance the Earth on day 1 (01 June). The high speed stream from coronal hole 84 is expected to have largely eased by the end of day 1. A further coronal hole high speed stream, from coronal hole 86, is then forecast to connect with Earth on day 3, with speeds of 500-550km/s. Geomagnetic activity is expected to be mainly Quiet through days 1 and 2, but with a slight risk of G1/Minor storms from any CME glance on day 1. A further risk of Active or G1/Minor Storms is possible on day 3 (03 June) due to the forecast connection to the next high speed stream.

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) is expected to be at background levels during this period. High energy electron flux (greater than 2MeV) is likely to continue at moderate to high levels, with a possibility of persistently high (1e3 pfu) levels continuing. Electron fluence levels are forecast to start above the Active (1e8 integrated pfu) threshold, but will depend on the behaviour of the electron flux due to any geomagnetic enhancements.

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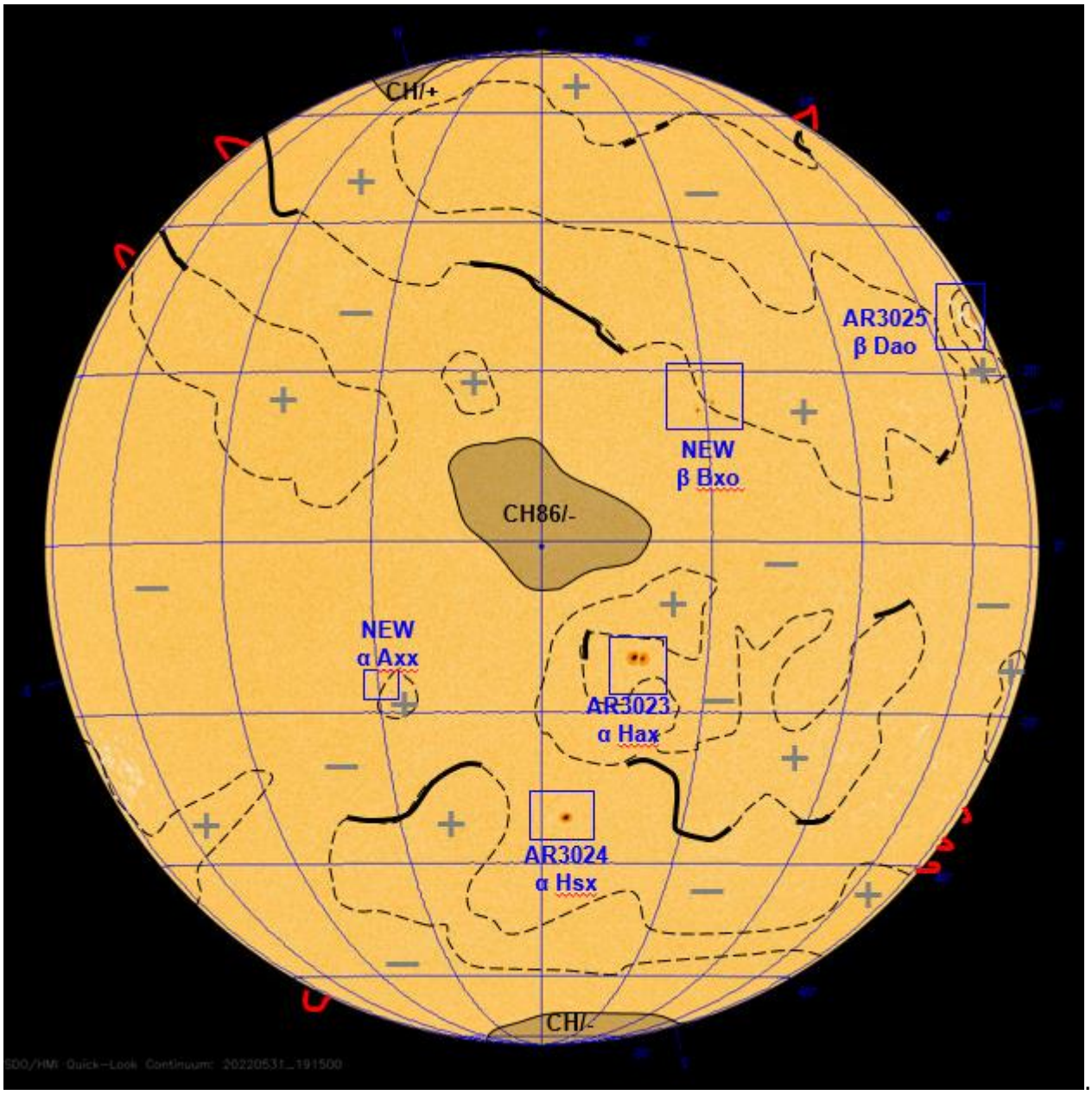
Figure 1. Solar Analysis Valid 31/2000UTC.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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Geomagnetic Storms:
A CME which left the Sun on 28 May, may glance the Earth on day 1 (01 June), but with low confidence and low probability.

The high speed stream from coronal hole 84 is due to wane to background during 01 June, with the next high speed stream from coronal hole 86 due to connect on day 3 (03 June). Speeds from this feature are estimated to be in the region of 500-550km/s.

Geomagnetic activity is expected to be mainly Quiet through days 1 and 2, but with a slight risk of G1/Minor storms from any CME glance on day 1. A further risk of Active or G1/Minor Storms is possible on day 3 (03 June) due to the forecast connection to the next high speed stream.

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	1	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Met Office Space Weather Technical Forecast

Radio Blackouts - X-Ray Flares:
Solar activity is expected to be Low or Very Low, with no significant sunspot regions on, or expected to rotate onto the visible disc. There is a slight chance of M-class flares, but this is a reducing risk as region 3025 rotates across the western limb.

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	10	10	5	5
Very Active	R3 to R5 X Class	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):
The high energy proton flux (greater than 10 MeV) is at background levels and is most likely to remain so through the period, with no significant regions on, or expected to rotate onto, the visible disc.

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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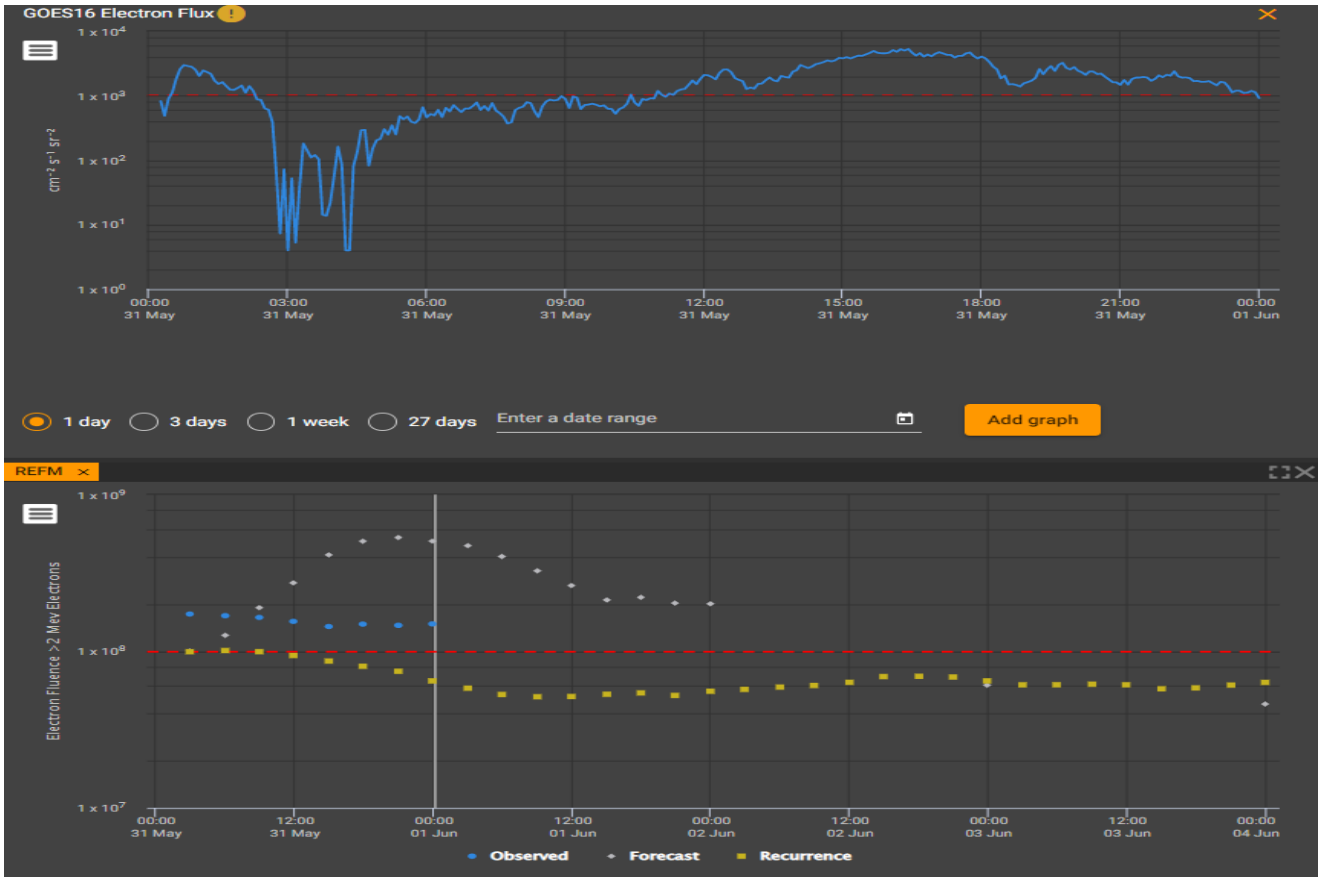
High Energy Electrons Event (≥ 2MeV):
High energy electron flux (greater than 2MeV) are varying between moderate and high, with sustained periods at high levels within the diurnal cycle. As the high speed stream from coronal hole 84 starts to decline, the peaks in electron flux are also expected to slowly decline. This reduction may then be arrested by the establishment of the high speed stream from coronal hole 86, although a sharp initial drop is possible due to any significant geomagnetic enhancements.

Electron fluence is expected to be mainly above the Active (1e8 integrated pfu) threshold, but with a declining trend dependent upon the strength of the connection to the high speed stream from coronal hole 86.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ 2 MeV ≥ $1x10^8$**	Yes	100	90	70	60
Very Active	**≥ 2 MeV ≥ $1x10^9$**	No	10	20	10	5

Figure 3: GOES 16 electron flux (top) and MOSWOC REFM model (bottom)



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